sustainable sanitation alliance

Case study of sustainable sanitation projects

Post disaster UDDT project in Water Drop Village De Yang City, Sichuan Province, China (draft)

Fig. 1: Project location

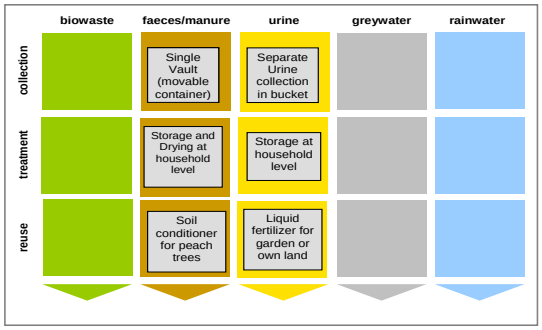

Fig. 2: Applied sanitation components in this project

1 General data

Type of project:

Pilot community based sanitation improvement project in a rural area (after earthquake disaster).

Project period:
Start of construction: Nov., 2008
End of construction: Feb., 2009
Start of operation: Mar., 2009
Ongoing monitoring period planned for: Jul. 2009
Part of emergency phase: Nov.2008 – Dec. 2008
Project end: Jul. 2009

Project scale:
Number of inhabitants covered: 500 (108 households)
108 UDDT household units established
Total investment (in €): 25,000

Address of project location:
Water Drop Village (where is this village and why does it have an English name if it is in rural China?), Guanghan County, Deyang City, Sichuan province, China

Planning institution:

Clean Water Alliances (China)

Executing institution:

Sichuan Yecao Culture

Supporting agency:

Beijing Vantone Foundation

2 Objective and motivation of the project

In May 2008 an earthquake measuring 7.9 on the Richter scale hit Sichuan province killing 68,000 people and leaving approximately 11 million people homeless as well as having many aftershocks. The Water Drop village belongs to De Yang city, one of the seven most severely damaged areas in from the earthquake in Sichuan province.

Fig. 3: De Yang city after the earthquake (May. 2008)[1]

After the earthquake, reconstruction of living areas for the local inhabitants top priority. To improve the sanitation condition in the aftermath of the earthquake, a pilot sustainable sanitation project was started in November 2008. (Why a pilot project? Who or which organisation decided to implement the project?) The project aimed to rebuild the basic sanitation facilities within the earthquake damaged rural village to improve the living conditions. In addition, a dam to supply water was constructed beside the village, to prevent the village's water source from being polluted by human sewage. Urine diversion dehydration toilets (UDDTs) were the chosen sustainable sanitation technology. Due to one of the key products produced in the village being peaches, there was the option of reuse of urine and dried faeces from UDDTs as fertiliser and soil conditioner. Reuse was seen to have the potential of bringing economical benefit to the villagers.

[1] Source: http://news.qq.com/a/20090729/001022.htm

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3 Location and conditions

Sichuan province is located in the southwest of China and is within the Sichuan basin which is surrounded by the Himalayas to the west. De Yang city experiences warm humid summers and dry cloudy winters due to the effects of being in the Sichuan basin. The population density in this rural area reaches 618 capita/km^2 which is much higher than the average population density in Sichuan province which is 172 capita/km^2. The average annual income is about 450 EUR (RMB 3977) and the main activity is agricultural with the main product being fruit.

There were 120 biogas toilets built with 110 in use serving 335 households before the earthquake (Were these in the Water Drop village? Were all of these toilets destroyed by the earthquake?) Due to the humid weather and local customs, an in-house toilet is not seen as acceptable by the villagers.

China's maternal mortality ratio has declined from 95 maternal deaths per 100,000 live births in 1989 to 48 per 100,000 in 2004 (Judith Banister, 2009).

4 Project history

On 6 November 2008, nearly half a year after the earthquake, the project team initiate and entered into the village. The first five households had been selected by the 10 November after five public meetings during the previous four days. Initial training and in-house investigations were given to each household. During this time the implementation team was formed and comprises of 4 farmers and 4 volunteers. The first five demo toilets were finished 3 days later. Directly thereafter another 103 households were selected.

On 15 December 2008, 50 toilets had been completed out of the 103 additionally selected households. On 18 December, the Eco-Toilet Forum, which has 130 organizations participating in it, visited the village sanitation project. By 15 January 2009, all 108 UDDTs had been completed, the project entered moved now from the construction phase to the usage phase which included further maintenance training for the users.

On 22 March 2009, mid-term monitoring and evaluation was done by an external examination team that included experts, sponsors, media and other NGOs. In July 2009, the final evaluation report was finished with suggestions for further improvements to future maintenance.

5 Technologies applied

Due to the consideration of water source protection, the cheaper construction cost and better combination with the existing biogas toilets, UDDT with one urine collection tank and one faeces collection tank were selected as the model technology. The two tanks are possible to be removed for further treatment. (More detail needed)

The urine is stored in the tank for at least a week and then it is diluted and used as fertilizer for the peach trees. The faeces is poured out either to the biogas tank or to a composting site at the household and then reused as fertilizer after at least 6 months.

6 Design information

The design information and construction materials that were used in the planning and execution of this project are described in this section.

The basic design dimensions of the toilet are length:160cm; width: 120cm; height: 200cm and the height of the door is 170cm. Standard design and construction methods were applied. The following construction materials were used:

- Bricks, cement and sand for the building of the basic infrastructure;
- Plastic wears: e.g. plastic squatting pans, plastic connection parts and plastic pipes for ventilation
- Wood and bamboo for the door and mixed with cement to form the wall (to comply to the local building customs)
- Steels for the roof and the supporting infrastructure

(Need more detail about the UDDT, design data, photos)

Fig. 4: Image example (Nov. 2008 during the construction)

7 Type and level of reuse

The dried faeces and diluted urine have been used in home gardens and for the peach trees. The diluted urine is used in the frequency of one or two times a month while the dried faeces are only used one or two times a year depending on the speed of feeding to the collecting baskets and the composting process. As some of the biogas tanks are built as public use, it is possible for some of the neighboring households to use the public biogas as the composting tank for their faeces. (How does the UDDT connect to the local biogas plant? How many biogas plants survived the earthquake?)

Kommentar [gtz1]: Which rural area?

Kommentar [gtz8]: What type of methods and designs?

Kommentar [gtz2]: Not sure if this ist he correct term

Kommentar [gtz3]: Why was precisely 103 households chosen? Were there criteria that had to be met for a household to be chosen?
Are there still households in the village without sanitation facilitities? As earlier it was mentioned that prior to the earthquake there were 120 toilets in this village?
Were many people in the village by the earthquake, hence the lower number of toilets needed?

Kommentar [gtz4]: How many people visited?

Kommentar [gtz5]: Is this report available? Can we get a copy of it?

Kommentar [gtz9]: How many people or farmers are using the urine and faeces in the area?

Kommentar [gtz6]: How does it combine better with a biogas toilet?

Kommentar [gtz10]: What does it mean?

Kommentar [gtz7]: Is the faeces already dry? If not then can we call this toilet a UDDT? As what is being dehydrated then?
Who is doing the emptying of the faeces and Urine?
Are protective gloves or safety measures being taken, as pathogens in the faeces would still be alive?

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8 Further project components

As the project is the first ecosan pilot to be completed in this area, it was reported to provincial level government after the completion of the 108 toilets had been achieved. The possible scale up scenarios with support from the local government are still being investigated.

9 Costs and economics

The standard UDDT in the project of 2008 cost 173 Euro (1533 RMB) including transport costs. The material price increased in the earthquake affected area, hence the UDDT material cost was higher than if the project had been conducted in another area. The design took into consideration the use of local materials to keep the cost as low as possible.

Again, due to the earthquake, the households were not able to contribute monetarily with the construction of toilets, as their resources were mostly directed to the reconstruction of their houses. Households were however responsible for the further operation and maintenance costs of their UDDTs.

Table 1: Cost breakdown for a standard UDDT (outside with superstructure including labour) in 2008 (exchange rate: 1 RMB = 0.1129 EUR in Nov. 2008)

Item	Unit Costs in RMB	Unit Costs in EUR
Plastic squatting plate	120	13.54
Cement	90	10.16
Sands & Stones	50	5.65
Bricks	300	33.87
Reinforcement (stainless steel)	60	6.77
Columns (wood) and accessories	320	36.13
Tiles & accessories	250	28.23
PVC ventilation pipe (110mm and 30 mm) and PVC bend 110mm with adhesive	73	8.24
Bamboo splint and accessories	72	8.13
Containers (urine, ash, paper)	23	2.60
Wooden door	70	7.90
Stainless steel handle	30	3.39
Lamps incl. switches, power wire	30	3.39
Instruction plates	15	1.69
Transportation cost (unit)	30	3.39
Subtotal	1533	173.08

10 Operation and maintenance

Before the end of the project, extensive training regarding the operation and maintenance of the UDDTs was provided to all the households within the project. Each household is responsible for the maintenance of their toilet, a job carried out mainly by the women.

11 Practical experience and lessons learnt

It is comparatively easier for the local residence to accept UDDTs as in China there is a long history of use of human and animal excreta as fertilizer for crops.

As soon as the first five demonstration toilets were built and in use, the acceptance rate increased dramatically throughout the village. The pre-training to the primary school students also helped a lot as children easily accept new ideas, which are shared with the family at home. Furthermore, once the project came to an end, the students became the volunteer steering team, responsible to check on a regular basis the operation and maintenance.

The largest problem stems from the lack of maintenance of the public toilets that were built for usage by tourists that visit the village during the spring time. The operation and maintenance of these toilets has been highlighted by a request for support from the village administration officers.

It might be helpful if a contract were signed before hand with the local government, specifying the responsibilities concerning the maintenance for the public toilets and setting up a special fund for the contract of some persons in charge of this matter.

12 Sustainability assessment and long-term impacts

A basic assessment (Table 2) was carried out to indicate in which of the five sustainability criteria for sanitation (according to the SuSanA Vision Document 1) this project has its strengths and which aspects were not emphasized (weaknesses).

Table 2: Qualitative indication of sustainability of system.
A cross in the respective column shows assessment of the relative sustainability of project ("+" means: strong point of project; "o" means: average strength for this aspect and "–" means: no emphasis on this aspect for this project).

	collection and transport			treatment			transport and reuse		
Sustainability criteria	+	o	-	+	o	-	+	O	-
• health and hygiene	X			X			X		
• environmental and natural resources	X			X			X		
• technology and operation	X			X			X		
• finance and economics		X				X	X		
• socio-cultural and institutional	X			X			X		

Kommentar [gtz11]: Has the provincial government decided to support a scaling up of this project?

Has this pilot project led to a larger project in the province?

Kommentar [gtz13]: Has this worked well?

Kommentar [gtz14]: Were these included in the earlier number mentioned of 108 UDDTS?

Kommentar [gtz15]: Who requested support?
And who issupposed to help?
Who is currently in charge of the maintenance and operation of these toilets?

Kommentar [gtz12]: Did every household have a garden to reuse the Urine and faeces

Kommentar [gtz16]: What is this paragraph referring to?

Is it necessary?

Kommentar [gtz17]: But there are no details about the treatment in the case study?

Kommentar [gtz18]: Need more details on the reuse before it can score so highly in this table

Kommentar [gtz19]: Are there more details why it is seen tob e a strong point inthis project?

Sustainability criteria for sanitation:
Health and hygiene include the risk of exposure to pathogens and hazardous substances and improvement of livelihood achieved by the application of a certain sanitation system.
Environment and natural resources involve the resources needed in the project as well as the degree of recycling and reuse practiced and the effects of these.
Technology and operation relate to the functionality and ease of constructing, operating and monitoring the entire system as well as its robustness and adaptability to existing systems.
Financial and economic issues include the capacity of households and communities to cover the costs for sanitation as well as the benefit, e.g. from fertilizer and the external impact on the economy.
Socio-cultural and institutional aspects refer to the socio-cultural acceptance and appropriateness of the system, perceptions, gender issues and compliance with legal and institutional frameworks.

For details on these criteria, please see the SuSanA Vision document "Towards more sustainable solutions" (www.susana.org).

With regards to long-term impacts of the project, the main expected impact was the provision of a sanitation solution that protects the water source of the region while offering extra agricultural benefits to the villagers. Accordingly, the earthquake was a trigger that enabled the reconstruction of sanitation facilitates, guided by the potentials offered by more sustainable technologies.

13 Available documents and references

Judith Banister (2009), Health, Mortality, and Longevity in China Today, http://iussp2009.princeton.edu/download.aspx?submissionId=90481

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